A Post-Carbon Energy Economy: Implications for the Mediterranean Countries

Silvana Bartoletto
Department of Economic and Legal studies (DISEG)
University of Naples Parthenope

The Mediterranean region is one of the main climate change hotspots, and pushing forward the energy transition to renewable energy sources will be crucial to counter global warming and environmental degradation. However, fossil fuels continue to represent the main energy source, while renewable energy sources satisfy only a marginal share of total demand.

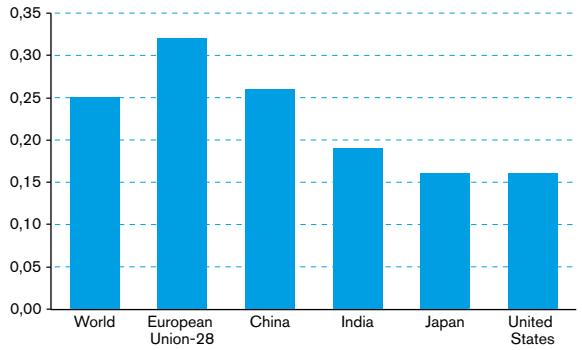
The green energy transition is a chance for the Mediterranean countries, and post-Covid-19 recovery plans can play a fundamental role for developing a new sustainable model of economic development. Like the Covid-19 pandemic, climate change has no borders. There is a fundamental need for an approach that goes beyond national borders, as only policies on a global scale can provide a solution to the problem of climate change.

The Need for a Global Strategy

Currently, renewable energy sources represent only 25% of world electricity production (Chart 36). This means that about 64% of electricity is produced by fossil fuels. Another important aspect is that coal, which is the most polluting fossil fuel, continues to represent the main energy source in electricity generation, with a share of about 38% in 2018 (IEA, 2020). If we consider world CO_2 emissions from fuel combustion, coal is the main polluter, with a share of 44%, followed by oil (34%), and natural gas (21%).

It is important to acknowledge that we are far from a decarbonized economy, and that national or regional policies are not enough to fight climate change; what we need now is a global strategy.

CHART 36 **Share of Renewable Sources in Electricity Generation**



Source: IEA, World indicators, data extracted on 14 Jul 2021 (2018 data).

Yet half of total CO_2 emissions are produced by three countries: China (28%), the United States (14.6%), and India (6.88%). China has increased renewable energy, but continues to invest in coal-fired power plants. In European countries, CO_2 emissions have significantly fallen over time, because EU Member States have agreed on higher renewable energy targets. Indeed, in December 2019, the European Commission presented the European Green Deal, proposing a package of measures for decarbonizing the EU's economy by 2050, in line with the Paris Agreement. Moreover, even if Europe reduces its emissions to zero, the problem of climate change would not be solved, because Europe represents only 8% of world CO_2 emissions. Implementing a global strategy is fundamental for decoupling economic growth from climate change.

The Mediterranean Countries

Diversity and inequality are the main features of the Mediterranean area, which comprises 25 countries that vary greatly in economic development and energy consumption. Population growth has been very rapid, particularly in North African and Middle Eastern countries, while the more advanced European countries have witnessed a sharp reduction in growth rates.
Increasing population and economic development has led primary energy consumption in the Mediterranean region to more than double, rising from about 393 million tons of oil equivalent (Mtoe) in 1971 to about 978 Mtoe in 2016 (Bartoletto, 2020).

We are far from a decarbonized economy, and national or regional policies are not enough to fight climate change

North African and Middle Eastern countries have been affected by a sharp increase in energy consumption, triggered by consumer subsidies, which have led to overconsumption. In the countries of North Africa, total energy consumption rose more than tenfold, from about 18 Mtoe in 1971 to 185 in 2016. While in 1971, North Africa accounted for only 4% of total consumption of the Mediterranean area, that figure has since risen to 19%. On the other hand, while EU Member States accounted for 81% of total consumption in 1971, by 2016 their share had fallen to 59%. Considering just the Latin area, in its strictest sense (Italy, France, Malta, Portugal and Spain), the reduction is even greater, from 80% to 55%.
If we consider per capita energy consumption, the gaps are considerable. In France, per capita consumption is 10 times higher than in Morocco, which is the country with the lowest per capita consumption, along with Syria. There is not only a divergence between the countries of the North and those of the South, but even within the individual areas the differences are considerable. However, the gap is narrowing, as shown by the estimation of the Gini index (Bartoletto, 2020).

Energy Consumptions by Fuel

The Mediterranean region is considered a major hotspot of climate change, whose negative effects could be both substantial and numerous. Climate change is aggravating the problem of water shortages, which have already hit many African cities. There is a risk that in the coming years new conflicts will be triggered by the lack of food and water.
The energy balance of the Mediterranean region is also dominated by fossil fuels, although coal plays a limited role, and there has been a significant growth in the use of renewable energy in European countries. Oil remains the main energy source, with a 37% share of the total, followed by natural gas, with a 28% share, and nuclear, with a 12% share. Yet about 86% of nuclear consumption is concentrated in France, which has a higher percentage of nuclear-generated electricity than any other country in the world.
Coal consumption has decreased from 17% in 1971 to 10% in 2016, and it is mainly concentrated in Turkey, Israel, Morocco and the countries of the former Yugoslavia, which account for the highest proportion of coal consumption with respect to the other countries of the Mediterranean region.
Renewable energy represents 11% of total energy consumption, about three percentage points lower than the global level. However, the progress of renewables in electricity production is significant, while in other end uses it still falls short of expectations (OME, 2020).
As the Mediterranean region is currently experiencing a sharp increase in population, it is expected that in the coming decades there will be a strong rise in the demand for energy, especially in southern Mediterranean countries. Thus a major effort is required to accelerate the transition to a low carbon economy.

The Growth of CO_2 Emissions

Despite the increase in renewable energy, CO_2 emissions have doubled from 1971 to the present. Almost half of such emissions are produced by countries belonging to the EU. Indeed, France, Italy and Spain produce about 42% of the Mediterranean region's total emissions.

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If we consider CO_2 growth rates, there has been a reduction, which is mainly due to European countries, while in other areas, the growth has been considerable. In North Africa, during the period 2004-2016, CO_2 emissions increased by 52 percent (Table 13). The growth would have been even higher without the Libyan crisis. The highest growth rate was registered in Algeria (73.8%), where oil and gas consumption rapidly increased over the same period. High growth rates (above 50 percent) were also registered in Egypt and Morocco, despite government efforts in both countries to increase production of renewable energy. In Tunisia, too, growth was sustained (32.6%).

TABLE 13 **Growth Rates of CO_2 Emissions in North Africa (percent)**

Years / Countries	1971-1981	1982-1992	1993-2003	2004-2016
North Africa	178.5%	49.9%	39.9%	52.3%
Algeria	273.3%	44.0%	27.0%	73.8%
Egypt	131.8%	58.9%	43.5%	59.8%
Libya	391.9%	28.9%	55.4%	2.1%
Morocco	110.6%	52.4%	45.2%	51.1%
Tunisia	118.9%	68.4%	33.6%	32.6%

Source: Bartoletto (2020).

Morocco is primarily focusing on solar and wind to generate electricity for sustainable and lasting development, since it has no oil and gas reserves, but a high potential for solar energy.

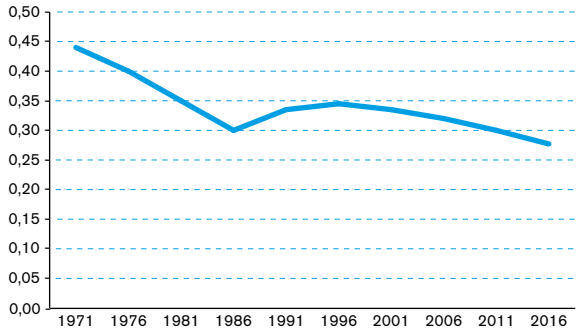
Despite these policies, CO_2 emissions increased by 51% from 2004 to 2016, since coal, which is the most polluting fossil fuel, continues to represent about 22.5% of total primary consumption, and coal imports have greatly increased over time.

A similar pattern may be observed in the Middle East, where Lebanon recorded a growth of 53%, and Jordan of 43%. By contrast, in Israel, there has been a significant reduction in growth rates of CO_2 emissions.

With respect to North Africa and Middle East countries, the pattern of CO_2 emissions for European countries that are part of the Mediterranean region is completely different. Indeed, in single European countries, CO_2 emissions have significantly fallen over time.

In order to establish whether the gap between different countries of the Mediterranean region is narrowing, we calculated the Gini index on per capita CO_2 emissions for the period from 1971 to 2016.

CHART 37 **Gini index on CO_2 Emissions, 1971-2016**



Source: Bartoletto (2020).

The estimation of the Gini index confirms that the reduction in the gap also concerns per capita CO_2 emissions, as well as per capita energy consumption as seen above. We can conclude that the growth in total CO_2 emissions in North Africa and Middle Eastern countries is due not only to population growth, and increase in per capita energy consumption, but especially to the increasing share of fossil fuel consumption. The growth in North Africa and the Middle East, and contrastingly, the reduction in European countries, is leading to a reduction in the divide between developed and emerging countries within the Mediterranean region.

Energy "Insecurity" in the Mediterranean Region

New tensions characterize the Mediterranean region, stemming from the recent fighting between Israel and Palestine, the war in Libya and Syria, and the dispute between Greece and Turkey for the control of waters

off the coast of Cyprus, where the subsoil is rich in hydrocarbons. Despite the 1995 Barcelona Conference and the creation of the Union for the Mediterranean in 2008, the "energy insecurity" of the Mediterranean region highlights the weaknesses of the Euro-Mediterranean integration process.

The Mediterranean region plays a strategic role for energy due to the presence of Libya and Algeria, which have large oil and gas reserves, and the discovery of new offshore gas fields in Egypt, Israel and Cyprus. The strategic role of the Mediterranean region is reinforced by the presence of pipelines that transport oil and gas from the Middle East, Russia, Azerbaijan and other former Soviet Union states to Europe and other consumer countries. The Mediterranean region also plays an important energy transit role, due to the presence of strategic choke points for the maritime traffic of oil tankers, such as the Suez Canal and the Turkish Straits.

The Covid-19 pandemic has upset world energy markets, causing a decline in energy demand, as well as in prices, with specific economic and political repercussions on countries heavily dependent on revenues from oil and gas exports. Oil and gas producing countries could experience political instability, as they feel the effect of a transition to low-carbon energy production. Saudi Arabia, Iran, Russia, Algeria and Libya, for example, are dependent on their exports just as the European countries, Turkey, Morocco and other energy importers remain vulnerable to their external suppliers and to price shocks. Global policies have to consider the close interdependence between producer and consumer countries, to avoid the drop in oil prices and decarbonization of the economy having serious social and economic consequences.

Conclusions

The Mediterranean region is still characterized by a high dependence on fossil fuels in different ways. Regulatory and financial incentives are critical to attract investments in renewables. Climate change has no borders, and post-Covid recovery plans are fundamental to push forward the climate agenda at the political level. To reduce CO_2 emissions, the revision of an obsolete system of emissions will be crucial. At the same time, negotiations at international level are fundamental, especially for those countries whose revenues are mainly based on oil and gas exports.

Global policies have to consider the close interdependence between producer and consumer countries, to avoid the drop in oil prices and decarbonization of the economy having serious social and economic consequences

In securing energy supplies, interactions between exporters, importers, producers and consumers are of key importance.

Recent fighting between Israel and Palestine, the war in Syria, and the recent epilogue of the war in Libya remind us once again of the strategic importance of the Mediterranean and the need to implement Euro-Mediterranean cooperation.

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